Summary

The U.S. Department of Energy (DOE or the Department) is proposing to clean up surface contamination and implement a ground water compliance strategy to address contamination that resulted from historical uranium-ore processing at the Moab Uranium Mill Tailings Site (Moab site), Grand County, Utah. Pursuant to the National Environmental Policy Act (NEPA), 42 *United States Code* (U.S.C.) §§ 4321 et seq., DOE prepared this draft environmental impact statement (EIS) to assess the potential environmental impacts of remediating the Moab site and vicinity properties (properties where uranium mill tailings were used as construction or fill material before the potential hazards associated with the tailings were known). DOE analyzed the potential environmental impacts of both on-site and off-site remediation and disposal alternatives involving both surface and ground water contamination. DOE also analyzed the No Action alternative as required by NEPA implementing regulations promulgated by the Council on Environmental Quality.

The 12 cooperating agencies are

Federal
- Bureau of Land Management
- National Park Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Nuclear Regulatory Commission

State
- State of Utah

Tribal
- Ute Mountain Ute Tribe

County
- Grand County
- San Juan County

Local
- City of Blanding
- Community of Bluff

DOE has entered into agreements with 12 federal, tribal, state, and local agencies to be cooperating agencies in the development and preparation of this EIS. Several of the cooperating agencies have jurisdiction by law and intend to use the EIS to support their own decision-making. The others have expertise relevant to potential environmental, social, or economic impacts within their geographic regions. During the preparation of the draft EIS, DOE met with the cooperating agencies, provided them with opportunities to review preliminary versions of the document, and addressed their comments and concerns to the fullest extent possible.

Regulatory Requirements

In 1978, Congress passed the Uranium Mill Tailings Radiation Control Act (UMTRCA), 42 U.S.C. §§ 7901 et seq., in response to public concern regarding potential health hazards of long-term exposure to radiation from uranium mill tailings. Title I of UMTRCA requires DOE to establish a remedial action program and authorizes DOE to stabilize, dispose of, and control uranium mill tailings and other contaminated material at 24 uranium-ore processing sites and associated vicinity properties. UMTRCA also directed the U.S. Environmental Protection Agency (EPA) to promulgate cleanup standards, which are now codified at Title 40 *Code of Federal Regulations* Part 192 (40 CFR 192), "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," and assigned the U.S. Nuclear Regulatory Commission (NRC) to oversee the cleanup and license the completed disposal cells.

In October 2000, Congress enacted the Floyd D. Spence National Defense Authorization Act for Fiscal Year (FY) 2001 (Public Law 106-398), amending UMTRCA Title I (which expired in 1998 for all other DOE sites) to give DOE responsibility for acquisition and remediation of the Moab site in accordance with UMTRCA Title I. The Floyd D. Spence Act also directed DOE to enter into arrangements with the National Academy of Sciences (NAS) to obtain the technical advice, assistance, and recommendations of NAS in objectively evaluating costs, benefits, and

risks associated with various remediation alternatives. Previously, in September 1998, the Moab mill owners, the Atlas Minerals Corporation (Atlas), filed for bankruptcy. The bankruptcy court appointed NRC and the Utah Department of Environmental Quality beneficiaries of a bankruptcy trust created in March 1999 to fund future reclamation and site closure. Later, the beneficiaries selected PricewaterhouseCoopers to serve as trustee. To support its remediation decision-making, in 1999 NRC completed the *Final Environmental Impact Statement Related to Reclamation of the Uranium Mill Tailings at the Atlas Site, Moab, Utah* (NUREG-1531, March 1999), which proposed stabilizing the tailings impoundment (pile) in place. In accordance with Public Law 106-398, DOE acquired the site in 2001 to facilitate remedial action. DOE's EIS builds upon the analyses and the alternatives evaluated in NRC's EIS and expands the scope of the EIS to include ground water remediation and vicinity properties.

Background

As shown in Figure S–1, the Moab site lies approximately 30 miles south of Interstate 70 (I-70) on U.S. Highway 191 (US-191) in Grand County, Utah. The 439-acre site is located about 3 miles northwest of the city of Moab (Figure S–2) on the west bank of the Colorado River at the confluence with Moab Wash. The site is bordered on the north and southwest by steep sandstone cliffs. The Colorado River forms the eastern boundary of the site. US-191 parallels the northern site boundary, and State Road 279 (SR-279) transects the west and southwest portion of the property. The Cane Creek Branch of the Union Pacific Railroad traverses a small section of the site just west of SR-279, then enters a tunnel and emerges about 1.5 miles to the southwest. Arches National Park has a common property boundary with the Moab site on the north side of US-191, and the park entrance is located less than 1 mile northwest of the site. Canyonlands National Park is located about 12 miles to the southwest.

History of the Moab Site

The Moab site is the site of a former uranium-ore processing facility that was owned and operated by the Uranium Reduction Company and later Atlas under a license issued by NRC. The mill ceased operations in 1984 and has been dismantled except for one building that is currently used by DOE for vehicle maintenance and could be used as office space in the future during site remediation. During its years of operation, the facility accumulated approximately 10.5 million tons of uranium mill tailings. Uranium mill tailings are naturally radioactive residue from the processing of uranium ore. Decommissioning of the mill began in 1988, and an interim cover was placed on the tailings pile between 1989 and 1995.

In 1996, Atlas submitted a reclamation plan and an application to NRC for an amendment to its existing NRC license to allow for reclamation of the site. Under the license amendment, Atlas was required to reclaim the tailings impoundment in accordance with the October 1996 submittal to NRC titled *Final Reclamation Plan, Atlas Corporation Uranium Mill and Tailings Disposal Area*.

The amendment to the NRC license also required preparation of an EIS to assess potential impacts from the 1996 reclamation plan, but Atlas filed for bankruptcy before the EIS could be completed and was released from all future liability with respect to the uranium mill facilities and tailings pile at the Moab site.

As reported in the 1999 Final NRC Environmental Impact Statement, which proposed stabilizing the tailings pile in place, NRC received numerous comments both in favor of and opposed to the proposed action. However, the EIS did not address ground water compliance or remediation of vicinity properties. NRC documented U.S. Fish and Wildlife Service (USF&WS) concerns regarding the effects of contaminants reaching the Colorado River; specifically, the effects on four endangered fish species and critical habitat. (In 1998, USF&WS had concluded in a Final Biological Opinion that continued leaching of existing concentrations of ammonia and other constituents into the Colorado River would jeopardize the razorback sucker and Colorado pikeminnow.)

To minimize potential adverse effects to human health and the environment in the short term, former site operators, custodians, and DOE have instituted environmental controls and interim actions at the Moab site. Controls have included storm water management, dust suppression, pile dewatering activities, and placement of an interim cover on the tailings to prevent movement of contaminated windblown materials from the pile. Interim actions have included restricting site access, monitoring ground water and surface water, and managing and disposing of chemicals to minimize the potential for releases to the environment. A pilot-scale ground water extraction system was implemented in the summer of 2003 to reduce the quantity of ground water contaminants discharging to the Colorado River.

Federal and state regulatory agencies have expressed concern about the effects of disposing of contaminated materials at the site and the effects of contaminated ground water entering the Colorado River. Stakeholders, including local and state governments, environmental interest groups, and downstream users of Colorado River water, have also expressed concern.

Current Status of the Moab Site

The tailings are located in a 130-acre unlined pile that occupies much of the western portion of the site. The top of the tailings pile averages 94 feet (ft) above the Colorado River floodplain (4,076 ft above mean sea level) and is about 750 ft from the Colorado River. The pile was constructed with five terraces and consists of an outer compact embankment of coarse tailings, an inner impoundment of both coarse and fine tailings, and an interim cover of soils taken from the site outside the pile area. Debris from dismantling the mill buildings and associated structures was placed in an area at the south end of the pile and covered with contaminated soils and fill. Radiation surveys indicate that some soils outside the pile also contain radioactive contaminants at concentrations above the EPA standards in 40 CFR 192.

Besides tailings, contaminated soils, and debris, other contaminated materials requiring cleanup include ponds used during ore-processing activities, disposal trenches, other locations used for waste management during mill operation, and buried septic tanks that are assumed to be contaminated. DOE estimates the total contaminated material at the Moab site and vicinity properties has a total mass of approximately 11.9 million tons and a volume of approximately 8.9 million cubic yards (yd^3). Evidence indicates that historical building materials may contain asbestos.

Ground water in the shallow alluvium at the site was contaminated by ore-processing operations. The Colorado River adjacent to the site has been affected by site-related contamination, mostly due to ground water discharge. The primary contaminant of concern in ground water and surface water is ammonia.

In addition to the contaminated materials currently at the Moab site, approximately 39,700 tons of tailings may have been removed from the Moab millsite and used as construction or fill material at homes, businesses, public buildings, and vacant lots in and near Moab. As a result, these vicinity properties may have elevated concentrations of radium-226 that exceed the maximum concentration limits in 40 CFR 192. On the basis of preliminary surveys conducted in the 1970s by EPA, 130 potential sites may require remediation. However, using past statistics and experience, DOE believes that only about 98 vicinity properties would actually need to be remediated. Additional characterization would be necessary to identify the current number and locations of vicinity properties. In accordance with the requirements of UMTRCA, DOE is obligated to remediate those properties where contaminant concentrations exceed the maximum concentration limits in 40 CFR 192, along with the Moab site.

Purpose and Need for Agency Action

The Moab site and vicinity properties near Moab, for which DOE has been given responsibility, contain contaminated materials in concentrations that exceed 40 CFR 192 maximum concentration limits and present a current and long-term potential source of risk to human health and the environment. DOE needs to take action to remediate the Moab site in accordance with UMTRCA Title I to fulfill its responsibilities under Public Law 106-398.

Alternatives

DOE is proposing to (1) remediate approximately 11.9 million tons of contaminated materials located on the Moab site and approximately 39,700 tons located on vicinity properties and (2) develop and implement a ground water compliance strategy for the Moab site. The reasonable surface remediation alternatives consist of encapsulating the contaminated material either on the Moab site or at one of three potential off-site locations. Under either the on-site or off-site disposal alternatives, ground water remediation would be implemented as part of the proposed activities. A No Action alternative is analyzed to provide a basis for comparison to the on-site and off-site disposal alternatives, as required by NEPA.

Surface Remediation Alternatives

On-Site Disposal
- Cost $166 million
- 7 to 10 years to complete

Off-Site Disposal
- Cost $329 million to $464 million (depending on location and transportation option)
- Up to 8 years to complete

No Action Alternative
- No costs incurred
- All activities at the Moab site would cease, affecting 3 to 4 current employees

Remediation of Surface Contamination and Ground Water

Each alternative (with the exception of the No Action alternative) would include both on-site and off-site activities:

- *Construction and Operations at the Moab Site*—these activities would include those needed for surface remediation, ground water compliance, and reduction of the contaminant mass in ground water discharging to the Colorado River. These activities would also include construction and operation of any transportation facilities needed at the site to either dispose of the contaminated material on the site or remove the materials from the site for off-site disposal.

- *Characterization and Remediation of Vicinity Properties*—these activities would include surveying, sampling soil, removing contaminated materials, and restoring and landscaping the properties. Contaminated materials from vicinity properties would first be transported to the Moab site under all remediation alternatives.
- *Construction and Operations at One of Three Off-Site Disposal Locations*—these activities are addressed only for the off-site disposal alternative and would include construction and operation of the disposal cell and any transportation facilities needed at any of the off-site disposal locations for handling and disposal of contaminated materials.
- *Construction and Operations Relating to Transportation*—these activities would include the following components:
  - Transportation of contaminated materials from vicinity properties to the Moab site (the estimated volume of contaminated materials from vicinity properties is included as part of the total volume of contaminated materials to be disposed of under all alternatives).
  - Transportation of materials from borrow areas to the Moab site and, under the off-site disposal alternative, to one of three off-site disposal locations.
  - Under the off-site disposal alternative, transportation of contaminated materials from the Moab site to one of three off-site disposal locations. Transportation would be by truck, rail, or slurry pipeline. In addition to transportation of contaminated materials to one of the off-site locations, construction activities would include (1) temporarily expanding existing roads and rail lines with overpasses and new sidings to provide safe access to the proposed sites, and (2) installing and later removing the slurry pipeline.
- *Monitoring and Maintenance*—these activities would include inspections and sampling conducted in accordance with the site's Long-Term Surveillance and Maintenance Plan, which would be approved by NRC for the Moab site and/or the off-site disposal cell.

On-Site Disposal

The on-site disposal alternative would involve placing contaminated site materials and materials from vicinity properties on the existing tailings pile and stabilizing and capping the tailings pile in place. The cap would be designed to meet EPA standards for radon releases. Surface remediation would remove surface contamination to either:

- A concentration of radium-226 in land averaged over any area of 1,076 square feet that does not exceed the background level by more than 5 picocuries per gram (pCi/g) averaged over the first 6 inches of soil below the surface and 15 pCi/g averaged over 6-inches of soil more than 6 inches below the surface (40 CFR 192.12); or
- Supplemental standards under 40 CFR 192.21

Final design and construction of the cap would meet the requirements for disposal cells under applicable EPA (40 CFR 192) standards. Flood protection would be constructed along the base of the pile, and cover materials for radon attenuation and erosion protection would be brought to the site from suitable borrow areas.

Supplemental Standards and Surface Contamination

Remedial action will generally not be necessary when (1) residual radioactive materials (RRM) occur in locations where remedial actions would pose a clear and present risk of injury to workers or the public, (2) remediation would produce health and environmental harm that is clearly excessive compared to the health or environmental benefits, or (3) the costs of remedial action are unreasonably high relative to the long-term benefits. This includes instances where site-specific factors limit the RRM hazards and locations from which they are difficult to remove or where only minor quantities of RRM are involved (40 CFR 192.21).

Under this alternative, the existing Moab Wash would be rechanneled to run through the former millsite area. Rechanneling would begin before completion of the disposal cell. The reconfigured channel would discharge into the river upstream near the approximate location of the pre-milling operations discharge point.

Following completion of on-site disposal, the area outside the cell would be recontoured, reclaimed, and revegetated. The disposal cell would be enclosed and protected by a security chain-link fence around its perimeter to discourage access.

Remediation of contaminated materials on the site and at vicinity properties is estimated to take 7 to 10 years to complete and cost approximately $166 million. This cost and time estimate does not include ground water remediation.

Off-Site Disposal

For the off-site disposal alternative, DOE would remove contaminated materials from the Moab site and transport them to another location for disposal. Approximately 11.9 million tons of contaminated material would be removed from the site. This total consists of the estimated 10.5-million-ton tailings pile; an estimated 600,000 tons of soil that was placed on top of the pile; 566,000 tons of subpile soil (assumed to be 2 ft thick); 234,000 tons of off-pile contaminated site soil; and 39,700 tons of vicinity property material that would be brought to the Moab site before shipment to an off-site location.

At the off-site disposal location, a disposal cell would be constructed. As with the on-site disposal alternative, the disposal cell cap would be designed to meet EPA standards for radon releases. Final design and construction would meet EPA (40 CFR 192) standards for disposal cells. Borrow materials would be obtained from off-site borrow areas for use as tailings cover construction materials and for use as clean backfill at the Moab site and vicinity properties.

DOE has identified three locations in Utah as potential off-site disposal locations (see Figure S–1):

- *Klondike Flats*—Klondike Flats is a low-lying plateau about 18 miles northwest of the Moab site, just northwest of the Canyonlands Field Airport and south-southeast of the Grand County landfill. The Klondike Flats site consists of undeveloped lands administered by the Bureau of Land Management (BLM) and the State of Utah School and Institutional Trust Lands Administration.
- *Crescent Junction*—The Crescent Junction site is approximately 30 miles northwest of the Moab site and 30 miles east of Green River, just northeast of Crescent Junction. The site also consists of undeveloped land administered by BLM and interspersed with lands owned by the State of Utah.
- *White Mesa Mill*—The White Mesa Mill site is approximately 85 miles south of the Moab site, 4 miles from the Ute Mountain Reservation and the community of White Mesa, and 6 miles from Blanding in San Juan County, Utah. This commercial mill is owned by the International Uranium (USA) Corporation (IUC) and disposes of uranium-bearing materials on site in lined ponds. It has been in operation since 1980. Although the facility has an NRC-issued license to receive, process, and permanently dispose of uranium-bearing material, it would need a license amendment from the State of Utah before it could accept material from

the Moab site. (Effective August 16, 2004, NRC transferred to Utah the responsibility for licensing, inspection, enforcement, and rulemaking activities for uranium and thorium milling operations, mill tailings, and other wastes.) Also, expansion of the existing facility would likely be necessary. The mill has the potential to process materials from the Moab site to extract valuable constituents and then dispose of the residues on site or to dispose of the material without processing. At this time, IUC has indicated that it may process water used for slurry transport but would not reprocess tailings.

The Klondike Flats and Crescent Junction sites are off-site disposal locations where new disposal cells could be constructed; the White Mesa Mill site is an existing off-site facility that could receive the contaminated materials.

For the off-site disposal alternative, three transportation modes are evaluated: truck, rail, and slurry pipeline for some or all of the off-site disposal locations.

- *Truck Transport*—Trucks would use US-191 as the primary transportation route for hauling contaminated materials to the selected disposal site. Trucks would be used exclusively for hauling borrow materials to the selected disposal site. Construction of highway entrance and exit facilities would be necessary to safely accommodate the high volume of traffic currently using this highway.
- *Rail Transport*—An existing rail line runs from the Moab site north along US-191 and connects with the main east-west line near I-70. The Klondike Flats and Crescent Junction sites could be served from this rail line with upgrades and additional rail sidings. There is no rail access from the Moab site to the White Mesa Mill site. Construction of a rail line from the Moab site to the White Mesa Mill site was not analyzed because of the technical difficulty, potential impacts, and high cost.
- *Slurry Pipeline*—This transportation mode would require the construction of a new buried pipeline from the Moab site to the selected disposal site and a buried water line to recycle the slurry water back to Moab for reuse in the pipeline.

Once the tailings and other contaminated material were removed, the Moab site would be reclaimed by recontouring and revegetating. DOE would evaluate future use of the site after completion of remedial action.

The off-site disposal of contaminated materials, including those from vicinity properties, is estimated to take up to 8 years to complete and to cost $329 million to $393 million for the closest site (Klondike Flats) and $418 million to $464 million for the farthest site (White Mesa Mill), depending on the transportation mode selected. These cost and time estimates do not include ground water remediation.

Ground Water Remediation

- Cost $10.75 million for design and construction and $906,000 annually under both on-site and off-site disposal alternatives
- 75 to 80 years to complete under either on-site or off-site disposal alternatives

Ground Water Remediation

Ground water remediation would be implemented as described in this section under both the on-site and off-site disposal alternatives. No other approaches to ground water remediation are being proposed. Therefore, this section does not discuss any alternatives for ground water remediation.

As part of its UMTRCA responsibilities, DOE established a Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project and prepared the *Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project* (PEIS) (DOE/EIS-0198, October 1996) and a Record of Decision (ROD) (62 *Federal Register* 22913 [1997]). The PEIS described and the ROD adopted a ground water remediation framework that considers human health and environmental risk, stakeholder input, and cost. In applying the framework, DOE assesses ground water compliance in a step-by-step approach, beginning with consideration of a no-remediation strategy and proceeding, if necessary, to consideration of passive strategies, such as natural flushing with compliance monitoring and institutional controls, and finally to consideration of more complex, active ground water remediation methods (such as pump and treat), or a combination of strategies, if needed. Through the process defined in the PEIS to assist in the selection of ground water compliance strategies, DOE prepared the *Site Observational Work Plan for the Moab, Utah, Site* (December 2003) (SOWP). The SOWP presents the detailed technical information that supports DOE's selection of a ground water compliance strategy for the Moab site and serves as a ground water technical support document for the EIS.

On the basis of this methodology and site-specific modeling, DOE's proposed action for ground water at the Moab site is to apply ground water supplemental standards and implement an active remediation system to intercept and control discharge of contaminated ground water to the Colorado River. Because of its naturally high salt content, the uppermost aquifer at the Moab site is not a potential source of drinking water. However, discharge of contaminated ground water has resulted in elevated concentrations of ammonia and other site-related constituents in the Colorado River adjacent to the site. These concentrations pose no risk to humans, but ammonia concentrations exceed levels considered to be protective of aquatic life. Therefore, the cleanup objective of the proposed ground water action is to protect the environment, particularly endangered species of fish that are known to use that portion of the river. Active remediation would be necessary to meet this goal.

The active remediation system would extract and treat ground water while natural processes act on ground water to decrease contaminant concentrations to meet long-term protective ground water cleanup goals. Active remediation would cease after long-term goals were achieved. Conceptually, the same

Ground Water Compliance Strategies

Supplemental Standards are essentially a narrative exemption from remediating ground water to prescriptive numeric standards (background concentrations, maximum concentration limits, or alternate concentration limits), if one or more of the eight criteria in 40 CFR 192.21 are met. At the Moab site, the applicable criterion is *limited use ground water*, (40 CFR 192.21[g]), which means that ground water has total dissolved solids (TDS) concentrations greater than 10,000 milligrams per liter (mg/L). These widespread high TDS concentrations are naturally occurring and are therefore not related to past milling activities at the site. The PEIS also discusses supplemental standards within the context of "no ground water remediation." However, guidance in 40 CFR 192.22 directs that where the designation of limited use ground water applies, remediation shall "assure, at a minimum, protection of human health and the environment."

No Remediation means that no ground water remediation is necessary because ground water concentrations meet acceptable standards. No remediation under the PEIS is not the same as "no action" under NEPA, because actions such as site characterization would be required to demonstrate that no remediation is warranted.

Natural Flushing means allowing the natural ground water movement and geochemical processes to decrease contaminant concentrations.

Active Remediation means using active ground water remediation methods such as gradient manipulation, ground water extraction and treatment, or in situ ground water treatment to restore ground water quality to acceptable levels.

system would be installed and operated at the Moab site regardless of whether the on-site or an off-site disposal alternative were implemented. Similarly, the duration of the action would likely be essentially the same regardless of whether the pile was remediated in place or relocated.

It would cost approximately $10.75 million to design and construct a ground water remediation system under either the on-site or off-site disposal alternative and approximately $906,000 annually to operate and maintain it. Construction would be completed approximately 5 years after issuance of a ROD for this EIS. The system would operate for 75 to 80 years.

No Action Alternative

Under the No Action alternative, DOE would not remediate contaminated materials either on the site or at vicinity properties. The existing tailings pile would not be covered and managed in accordance with standards in 40 CFR 192. No short-term or long-term site controls or activities to protect human health and the environment would be continued or implemented. Public access to the site is assumed to be unrestricted. All site activities, including operation and maintenance, would cease. A compliance strategy for contaminated ground water beneath the site would not be developed in accordance with standards in 40 CFR 192. No institutional controls would be implemented to restrict use of ground water, and no long-term stewardship and maintenance would take place. Because no activities would be budgeted or scheduled at the site, no further initial, interim, or remedial action costs would be incurred. DOE recognizes that this scenario would be highly unlikely; however, it has been included as a part of the EIS analyses to provide a basis for comparison to the action alternatives assessed in the EIS, as required by NEPA.

Preferred Alternative

DOE has not yet determined whether on-site or off-site disposal is its preferred alternative. DOE has not yet identified either a preferred location for an off-site disposal cell or a preferred mode of transportation for relocating the tailings if the off-site disposal alternative is selected. However, with the exception of the No Action alternative, the proposed ground water strategy would be applicable to both the on-site and off-site alternatives. DOE intends to consider the results of the analyses provided in this draft EIS, the relative costs among the alternatives, and other factors, such as public and agency comments on this draft EIS (including the views of cooperating agencies), in determining its preferred alternative for the disposal cell location and remediation of vicinity properties. DOE's preferred alternative will be based on these considerations and identified in the final EIS.

Several cooperating agencies have expressed preferences for off-site disposal. In some instances, the areas of controversy reflect an opinion on which of the alternative actions DOE should select as its preferred alternative. The State of Utah has stated that the tailings should be moved to an off-site location due to uncertainties in predicting river migration and the ability of on-site disposal to meet protective aquatic standards. The City of Moab and Grand County have stated that the tailings pile should be moved to Klondike Flats for aesthetic and other reasons.

The Ute community expressed a strong preference that the tailings pile should not be moved to White Mesa Mill due to the high potential for adverse impacts to cultural resources, traditional cultural properties, and other impacts. As downstream users, the Town of Bluff also objects to disposal at White Mesa Mill. However, San Juan County and the City of Blanding have stated

that the future reuse of a slurry pipeline to White Mesa Mill would offer substantial economic benefits to agriculture in the region.

Description and Comparison of Environmental Consequences

The following text summarizes the potential impacts (both adverse and beneficial) to the physical, biological, socioeconomic, cultural, and infrastructure environment that could occur under the on-site disposal alternative, the off-site disposal alternative, and the No Action alternative. Human health impacts are also summarized. This section also compares the major differences in impacts among the alternatives and the differences among transportation modes under the off-site disposal alternative.

Disposal Site, Transportation, and Vicinity Property Impacts

Geology and Soils. Under either the on-site disposal alternative or the No Action alternative, the combination of the processes of subsidence and incision would slowly affect the tailings pile by lowering it in relation to the Colorado River. This impact would not occur under the off-site disposal alternative because the pile would be removed. There is also the potential for minor geologic instabilities in areas surrounding the White Mesa Mill site. Sand and gravel resources beneath the Moab site would be unavailable for commercial exploitation under all the alternatives due to residual contamination, even after surface and ground water remediation was complete. There are no known geologic resources beneath any of the alternative off-site disposal cell locations that would be affected by the proposed actions. Under any of the action alternatives, approximately 234,000 tons of contaminated site soil would be excavated and disposed of with the tailings.

Air Quality. Under the on-site and off-site disposal alternatives, emissions of particulate matter would occur during construction and excavation operations and would require dust control measures. Operation of vehicles and construction equipment would result in emissions of criteria air pollutants. Air pollutant emissions would be greater under the off-site disposal alternative as compared to the on-site disposal alternative, primarily because of the need to transport the tailings. Among the alternative off-site locations, transporting the tailings to the White Mesa Mill site would result in the largest volume of air pollutants because of the longer distance to be traveled. With respect to the alternative modes of transportation under the off-site disposal alternative, transportation of the tailings by slurry pipeline would involve less air pollution than would either truck or rail transportation due to the lower level of exhaust emissions. Such emissions would be about the same for truck or rail transportation. However, none of the proposed action alternatives would result in air emissions that exceed National Ambient Air Quality Standards or Prevention of Significant Deterioration increment limits.

A detailed human health analysis that includes health impacts associated with air quality is provided in Appendix D of the EIS. The design and construction of the disposal cell cover at all disposal sites would ensure that radon emissions would be below applicable health standards. Under any of the proposed action alternatives, long-term air emissions at the Moab site from technologies evaluated for active ground water remediation would not exceed health standards for workers or the public.

Ground Water. Ground water remediation would be implemented under both the on-site and off-site disposal alternatives. Under the on-site and off-site disposal alternatives, supplemental